**Successful Genome Canada Funding**

Dr. William Hsiao, BC Public Health Microbiology & Reference Laboratory (BCPHMRL) Bioinformatician and team were recently awarded funding from Genome Canada under the Bioinformatics and Computational Biology Competition. This competition arose out of the prioritization made by Genome Canada in partnership with the Canadian Institutes of Health Research (CIHR), to support the infrastructure required for computational biology in Canada. Modern genomics technologies produce large, complex amounts of data that require analysis and integration. The next generation of tools supported by this funding will provide the research community broad access to these tools while supporting analysis, data mining and a better understanding of the associated and underlying biology.

Over 100 proposals were submitted across Canada. Of the 17 awards, BC received 7 awards or about $2.7 million from $6.2 million available in funding.

The team led by Drs. Fiona Brinkman (Lead PI, Simon Fraser University), William Hsiao (co-PI, BCPHMRL) and Gary Van Domselaar (co-PI, National Microbiology Laboratory) will work over the next three years to address gaps in the use and sharing of whole genome sequence data of infectious agents. This will be accomplished by developing a robust genomics analysis platform (code named IRIDA for Integrated Rapid Infectious Disease Analysis) with easy-to-use tools. Public health workers and microbiologists will be trained to use the system to better manage communicable diseases and provide quicker responses to infectious disease outbreaks using whole genome sequence data.
Changes in Rabies Serology Reporting

Testing for rabies virus antibody for pre-and post-exposure vaccinees and for clinical cases is performed by the National Microbiology Laboratory (NML). In British Columbia, such sera are sent to the BCPHMRL and then forwarded to NML. For stat or urgent requests, the NML requests contact information on the ordering physician, public health nurse, MOH, etc. so that test results can be reported in parallel to the submitter treating the patient and the BCPHMRL as soon as possible.

To facilitate this improved communication, it is requested that for all stat/urgent cases, contact information (name, address, telephone number, fax number) be entered on the BCPHMRL Serology Screening Requisition form. NML will no longer be able to provide results directly to individuals that contact them and will refer their requests to the BCPHMRL.

These changes are expected to improve the turnaround for rabies serology results reporting.
Neisseria gonorrhoeae Susceptibility Testing Trends

Gonorrhea, second most common sexually transmitted infection after chlamydia, is primarily diagnosed by nucleic acid-based testing. However, for the purpose of monitoring antimicrobial resistance trends, culture based methods are required for susceptibility analysis against antibiotic agents. Recent reports demonstrate emergence of resistant strains not only in Canada, but also globally (MMWR, 2013; 62(06): 103-6).

The PHMRL Public Health Advanced Bacteriology & Mycology (PHABM) Program tests for gonococcal infections on endocervical, rectal, pharyngeal and urethral swabs and urine samples by nucleic acid tests (NATs) (all samples) and by culture on potentially high yield samples which is consistent with national testing guidelines (Canadian Guidelines on Sexually Transmitted Infections, updated 2010) The PHABM program is the sole lab in BC that performs antimicrobial susceptibility testing so that resistance trends may be monitored for first-line cephalosporins as well as alternative antimicrobials. These include azithromycin, ceftriaxone, cefixime, ciprofloxacin, penicillin, spectinomycin, and tetracycline.

We reported in our September, 2011 issue that elevated minimum inhibitory concentrations (MICs) were being observed for cefixime between 2006 to 2010. We are happy to report the overall decreasing MIC trends for 2010-2012 for both cefixime and ceftriaxone (Figure 1). From 2010-2012, 0.6%, 2.1% and 0.3% of isolates, respectively, were found to have MICs of ≥0.25 μg/mL while 2.9%, 0.6% and 0.3% had MICs of ≥0.125 μg/mL; these are the new thresholds established by the World Health Organization for decreased susceptibility (Table 1). After a slight increase in MICs in 2011, azithromycin also demonstrated decreased MICs in 2012 (Figure 1). The percentage of isolates with resistance to azithromycin (CLSI (2011) threshold of MIC ≥2 μg/mL) was found to be 2.1 % in 2010, 0.2% in 2011 and 0.8% in 2012 (0.9% over the 3 years).

Table 1. Criteria for decreased susceptibility to cephalosporins (WHO, 2012)

<table>
<thead>
<tr>
<th>Drug</th>
<th>MIC (μg/mL)</th>
</tr>
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<tbody>
<tr>
<td>cefixime</td>
<td>≥0.25</td>
</tr>
<tr>
<td>ceftriaxone</td>
<td>≥0.125</td>
</tr>
</tbody>
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Additionally, a case of high azithromycin resistance (MIC >256 μg/mL) was observed in 2012*. This was the 3rd case of high azithromycin resistance in the country and was revealed to be a unique strain by the National Microbiology Laboratory. Azithromycin resistancein Neisseria gonorrhoeae was first observed in Canada in 1997; since then, resistance mechanisms have been described (Ng et al, 2002) and further differentiated for high resistance strains (Chisholm et al, 2010). No additional high resistance cases have been detected since.

These trends and unusual cases underscore the need for the close partnerships that have been established between the PHMRL, BC Centre for Disease Control (BCCDC) STI Clinics as well as front-line community laboratories and physicians for continued antimicrobial resistance surveillance as well as support to clinicians in the event of treatment failures.
**Neisseria gonorrhoeae Susceptibility Testing Trends**

Figure 1
Percentage of tested N. gonorrhoeae isolates with elevated minimum inhibitory concentrations (MICs) to cefixime (A), ceftriaxone (B), and azithromycin (C) from 2010-April 30, 2013. Public Health Advanced Bacteriology & Mycology Program, PHMRL. MIC units are in μg/mL. *A case of high azithromycin resistance (>256 μg/mL) was observed in 2012.

A
Percentage of tested isolates with elevated MIC to Cefixime

B
Percentage of tested isolates with elevated MIC to Ceftriaxone

C
Percentage of tested isolates with elevated MIC to Azithromycin

References


Gastrointestinal Outbreaks

In April, the Environmental Microbiology Program at the BCPHMRL investigated 10 gastrointestinal (GI) outbreaks which is on the lower end of what has typically been observed at this time over the past 5 years (Figure 2). Outbreaks were identified from 3 long-term care facilities, 3 daycares/schools, 2 hospitals and 1 restaurant (Figure 1). Samples for laboratory testing to date were submitted for 6 (60%) of these outbreaks. Of these, norovirus was confirmed in 3 (50%) of these outbreaks at 2 hospitals and 1 unknown facility/event type; 2 (33%) outbreaks had unknown etiology.

Figure 2
Gastrointestinal outbreaks investigated* since January, 2013, Environmental Microbiology, Bacteriology & Mycology, Parasitology and Virology Programs, BCPHMRL.

* The data available are from outbreaks in which the BCPHMRL has been notified. Some acute care microbiology laboratories are also testing for norovirus in the province and these data may not include outbreaks from all Health Authorities. Given the nature of GI outbreaks, samples are not always available for testing.
Respiratory Outbreaks

In April, samples were submitted for 17 respiratory outbreak investigations at the BCPHMRL from 16 long-term care (LTC) facilities and 1 rehabilitation centre. The number of outbreaks investigated has been on the lower end of what has been historically observed except for week 16 when 8 outbreaks were investigated (Figure 3).

Influenza B was detected in 4 (24%) of these outbreaks while influenza A(H3) was detected in another outbreak. A variety of other respiratory pathogens were also detected this month, including: enter/rhinovirus in 2 (12%) of these outbreaks, RSV in 2 (12%) of these outbreaks, coronavirus in 2 (12%) of these outbreaks, and one outbreak with coinfection of entero/rhinovirus and HMPV; parainfluenza was detected at the rehabilitation centre.

Figure 3
Respiratory outbreaks investigated* by respiratory season, Virology Program, BCPHMRL.
Respiratory Surveillance

Test volumes for respiratory testing in the BCPHMRL Virology Laboratory remained stable over the weeks of April, resembling volumes seen in the 2011/12 season (Figure 4). Influenza A positivity rates decreased over the month, ranging from 1-11%; these have been lower than rates seen at this time in the previous season (Figure 4). Influenza B rates increased slightly in week 15 before falling in weeks 16-17, with detection rates of 5-15%, compared to 3-7% in the 2011/12 season (Figure 4). RSV positivity rates have decreased from 19% down to 6% at the end of April.

Nationally, influenza A activity generally decreased in all provinces in April with detection rates either at or below the national rate from the previous season (Figure 5). Influenza B rates have fluctuated above and below the national rate from the previous season in April; detection rates generally increased in Ontario and the Atlantic provinces and fluctuated in the Prairies, BC and Quebec (Figure 5).

Figure 4
Respiratory testing volumes and influenza percent positivity, Virology Program, BCPHMRL.

Figure 5
Influenza A percent positivity across Canada, 2012/2013 season.
Source: FluWatch, Public Health Agency of Canada

Figure 6
Influenza B percent positivity across Canada, 2012/2013 season.
Source: FluWatch, Public Health Agency of Canada
A Report of the BC Public Health Microbiology & Reference Laboratory, Vancouver, BC

The BC Public Health Microbiology Reference Laboratory (BCPHMRL) at the BCCDC site provides consultative, interpretative, testing and analyses for clinical and environmental infectious diseases in partnership with other microbiology labs and public health workers across the province and nationally. The PHMRL is the provincial communicable disease detection, fingerprinting and molecular epidemiology centre providing advanced and specialized services along with international defined laboratory core functions province-wide.

This report may be freely distributed to your colleagues. If you would like more specific information or would like to include any figures for other reporting purposes, please contact us.

Editor: Yin Chang  Contact: yin.chang@bccdc.ca  Website: www.bccdc.ca/PHSALaboratories

Co-Editors:

Biosafety, Biosecurity, Biohazard Containment Program
Public Health Lead: Neil Chin
Assistant Biosafety Officer: John Tansey

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